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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/802,586	03/17/2004	Joel David Munter	MP1502	5149
64768 7590 06/04/2007 MARSHALL, GERSTEIN & BORUN, LLP (MARVELL) 233 SOUTH WACKER DRIVE 6300 SEARS TOWER CHICAGO, IL 60606-6357			EXAMINER WANG, BEN C	
			ART UNIT 2192	PAPER NUMBER
			MAIL DATE 06/04/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/802,586	Applicant(s) MUNTER ET AL.	
	Examiner Ben C. Wang	Art Unit 2192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/23/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. Claims 1-30 are pending in this application and presented for examination.

#### ***Claim Rejections – 35 USC § 102(b)***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102(b) that form the basis for the rejections under this section made in this office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Chauvel et al. (Pub. No. US 2004/0010785 A1) (hereinafter 'Chauvel')
3. **As to claim 1**, Chauvel discloses a method comprising: receiving a plurality of non-native instructions ([0008] - the JVM executes the byte-codes just as a processor executes machine code; however, the byte-codes do not directly control the underlying hardware; instead, they are interpreted by the JVM) in a selected one of a source form and an intermediate form ([0008] – JAVA™ programs [source form] are compiled into “byte-codes” [an intermediate form]); and compiling the plurality of non-native instructions to generate object code for the non-native instructions ([0063] – the profiling techniques described herein could be adapted to take into account an interpreter-base execution and a JIT one; Just In Time compilers may improve performance due to their sophisticated optimizations created dynamically), including optimizing the generated object

code to improve at least a selected one of a power level required and an amount of energy required to execute the generated object code in a target execution environment (Abstract – creating application profiles that indicate the number of execution of each operation in the application and virtual machine profiles which indicate the time/energy consumed by each operation on a particular hardware platform; an application profile in conjunction with the virtual machine profile can be used to generate time and/or energy estimates for the application; [0062] – to adapt the JVM profile in order to obtain energy consumption estimations of a JAVA™ application; instead of (or in addition to) profiling the execution time on the target, the estimation of energy consumption could be performed using the same principle as for execution; the energy performance (and execution time performance) could be used by the target device for scheduling applications; [0066], Lines 32-35 – acquiring a virtual machine profile that relates power consumption to individual operations; [0010] – to optimize an application, estimations of execution time or energy consumption are often needed; this is particular true in the case of mobile devices, such as smart phones, personal digital assistants, and the like, which have limit energy and processing resources).

4. **As to claim 11**, Chauvel discloses in an electronic device, a method of operation, comprising: receiving a plurality of non-native instructions ([0008], the JVM executes the byte-codes just as a processor executes machine code; however, the byte-codes do not directly control the underlying hardware; instead,

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they are interpreted by the JVM); executing the non-native instructions for an initial number of times ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]); and compiling the non-native instructions into object code after executing the received non-native instructions for said initial number of times ([0063] – the profiling techniques described herein could be adapted to take into account an interpreter-base execution and a JIT one; Just In Time compilers may improve performance due to their sophisticated optimizations created dynamically).

5. **As to claim 15**, Chauvel discloses an article of manufacture comprising: a computer readable medium (Fig. 1b – element of 16 – HW Platform; [0025], Lines 1-2, 5-11 – a JVM profile is generated for a specific hardware platform); and a plurality of instructions designed to implement a compiler to compile non-native instructions to generate object code for the non-native instructions, including optimizing the generated object code to improve at least a selected one of a power level required and an energy required to execute the generated object code (Abstract – creating application profiles that indicate the number of

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execution of each operation in the application and virtual machine profiles which indicate the time/energy consumed by each operation on a particular hardware platform; an application profile in conjunction with the virtual machine profile can be used to generate time and/or energy estimates for the application; [0062] – to adapt the JVM profile in order to obtain energy consumption estimations of a JAVA™ application; instead of (or in addition to) profiling the execution time on the target, the estimation of energy consumption could be performed using the same principle as for execution; the energy performance (and execution time performance) could be used by the target device for scheduling applications; [0066], Lines 32-35 – acquiring a virtual machine profile that relates power consumption to individual operations; [0010] – to optimize an application, estimations of execution time or energy consumption are often needed; this is particular true in the case of mobile devices, such as smart phones, personal digital assistants, and the like, which have limit energy and processing resources).

6. **As to claim 18**, Chauvel discloses an article of manufacture comprising: a computer readable medium (Fig. 1b – element of 16 – HW Platform; [0025], Lines 1-2, 5-11 – a JVM profile is generated for a specific hardware platform); and a plurality of instructions designed to implement a runtime manager equipped to receive a plurality of non-native instructions, execute the non-native instructions for an initial number of times ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the

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application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]), and invoke a compiler to compile the non-native instructions into object code after executing the received non-native instructions for said initial number of times ([0063] – the profiling techniques described herein could be adapted to take into account an interpreter-base execution and a JIT one; Just In Time compilers may improve performance due to their sophisticated optimizations created dynamically).

7. **As to claim 22**, Chauvel discloses a system, comprising: a storage medium having stored therein a plurality of instructions implementing a compiler to compile non-native instructions to generate object code for the non-native instructions ([0063] – the profiling techniques described herein could be adapted to take into account an interpreter-base execution and a JIT one; Just In Time (JIT) compilers may improve performance due to their sophisticated optimizations created dynamically), including optimizing the generated object code to improve at least a selected one of a power level required and an energy required to execute the generated object code; and a processor coupled to the storage medium to execute the instructions implementing the compiler (Abstract

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– creating application profiles that indicate the number of execution of each operation in the application and virtual machine profiles which indicate the time/energy consumed by each operation on a particular hardware platform; an application profile in conjunction with the virtual machine profile can be used to generate time and/or energy estimates for the application; [0062] – to adapt the JVM profile in order to obtain energy consumption estimations of a JAVA™ application; instead of (or in addition to) profiling the execution time on the target, the estimation of energy consumption could be performed using the same principle as for execution; the energy performance (and execution time performance) could be used by the target device for scheduling applications; [0066], Lines 32-35 – acquiring a virtual machine profile that relates power consumption to individual operations; [0010] – to optimize an application, estimations of execution time or energy consumption are often needed; this is particular true in the case of mobile devices, such as smart phones, personal digital assistants, and the like, which have limit energy and processing resources).

8. **As to claim 26**, Chauvel discloses a system, comprising: a communication interface to receive a plurality of non-native instructions ([0010], Lines 1-3 – to optimize an application, estimations of execution time or energy consumption are often needed; this is particularly true in the case of mobile devices...; [0061], Lines 1-7 – can be downloaded through a network); a storage medium coupled to the communication interface, and having stored therein a



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plurality of instructions designed to implement a runtime manager equipped to execute the received non-native instructions for an initial number of times ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]), and invoke a compiler to compile the non-native instructions into object code after executing the received non-native instructions for said initial number of times ([0063] – the profiling techniques described herein could be adapted to take into account an interpreter-base execution and a JIT one; Just In Time compilers may improve performance due to their sophisticated optimizations created dynamically); and a processor coupled to the storage medium to execute the instructions implementing the runtime manager ([0008]).

9. **As to claim 2** (incorporating the rejection in claim 1), Chauvel discloses the method wherein said receiving comprises receiving the non-native instructions in a byte code form ([0024], Lines 3-7 – the application profile is a byte-code based profile which indicates how many times each operation (such as

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a byte-code) is used during execution of the application, or in specified parts of the application).

10. **As to claim 3** (incorporating the rejection in claim 1) and **claim 16** (incorporating the rejection in claim 15), Chauvel discloses optimizing comprises analyzing an object code segment for execution power level requirement, and determining whether an alternative object code segment with lower execution power level requirement is available (Abstract – creating application profiles that indicate the number of execution of each operation in the application and virtual machine profiles which indicate the time/energy consumed by each operation on a particular hardware platform; an application profile in conjunction with the virtual machine profile can be used to generate time and/or energy estimates for the application; [0062] – to adapt the JVM profile in order to obtain energy consumption estimations of a JAVA™ application; instead of (or in addition to) profiling the execution time on the target, the estimation of energy consumption could be performed using the same principle as for execution; the energy performance (and execution time performance) could be used by the target device for scheduling applications; [0066], Lines 32-35 – acquiring a virtual machine profile that relates power consumption to individual operations; [0010] – to optimize an application, estimations of execution time or energy consumption are often needed; this is particular true in the case of mobile devices, such as smart phones, personal digital assistants, and the like, which have limit energy and processing resources).

11. **As to claim 4** (incorporating the rejection in claim 1) and **claim 17** (incorporating the rejection in claim 15), Chauvel discloses optimizing comprises analyzing an object code segment for execution energy consumption, and determining whether an alternative object code segment with lower execution energy consumption is available (Abstract – creating application profiles that indicate the number of execution of each operation in the application and virtual machine profiles which indicate the time/energy consumed by each operation on a particular hardware platform; an application profile in conjunction with the virtual machine profile can be used to generate time and/or energy estimates for the application; [0062] – to adapt the JVM profile in order to obtain energy consumption estimations of a JAVA™ application; instead of (or in addition to) profiling the execution time on the target, the estimation of energy consumption could be performed using the same principle as for execution; the energy performance (and execution time performance) could be used by the target device for scheduling applications; [0066], Lines 32-35 – acquiring a virtual machine profile that relates power consumption to individual operations; [0010] – to optimize an application, estimations of execution time or energy consumption are often needed; this is particular true in the case of mobile devices, such as smart phones, personal digital assistants, and the like, which have limit energy and processing resources).

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12. **As to claim 5** (incorporating the rejection in claim 1), Chauvel discloses the method wherein the method further comprises executing the non-native instructions for an initial number of times ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]); and performing said compiling only after executing the non-native instructions for said initial number of times ([0063] – the profiling techniques described herein could be adapted to take into account an interpreter-base execution and a JIT one; Just In Time compilers may improve performance due to their sophisticated optimizations created dynamically).

13. **As to claim 6** (incorporating the rejection in claim 5), Chauvel discloses the method wherein the method further comprises determining the initial number of times the received non-native instructions are to be executed before performing compiling the received non-native instructions ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number

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of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]).

14. **As to claim 7** (incorporating the rejection in claim 6), Chauvel discloses the method wherein the method further comprises monitoring said compiling for power level required to perform compilation; and updating a current understanding of power level required for compilation used to determine the initial number of times received non-native instructions are to be executed before compiling the received non-native instructions ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]), if said monitoring observes a power level required for compilation to be different from the current understanding (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated

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with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a – a state diagram describing the generation timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045] – the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile).

15. **As to claim 8** (incorporating the rejection in claim 6), Chauvel discloses the method wherein the method further comprises monitoring said compiling for amount of energy required to perform an average compilation; and updating a current understanding of amount of energy required for an average compilation used to determine the initial number of times received non-native instructions are to be executed before compiling the received non-native instructions, if said monitoring observes an amount of energy required for compilation to be different from the current understanding (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a –

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a state diagram describing the generation timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045] – the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile) .

16. **As to claim 9** (incorporating the rejection in claim 1), Chauvel discloses the method wherein the generated object code comprises a plurality of native instructions, and the method further comprises monitoring execution of the generated object code for power level required to execute the native instructions; and updating power level requirements of selected ones of the native instructions if said monitoring observes power level requirements for the selected ones of the native instructions to be different from current understandings of the power level requirements of the selected ones of the native instructions (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a – a state diagram describing the generation timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045]

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– the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile).

17. **As to claim 10** (incorporating the rejection in claim 1), Chauvel discloses the method wherein the generated object code comprises a plurality of native instructions, and the method further comprises monitoring execution of the generated object code for amount of energy required to execute the native instructions; and updating energy requirements of selected ones of the native instructions if said monitoring observes energy requirements for the selected ones of the native instructions to be different from current understandings of the energy requirements of the selected ones of the native instructions (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a – a state diagram describing the generation timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045] – the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times



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associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile).

18. **As to claim 13** (incorporating the rejection in claim 11), Chauvel discloses the method wherein the method further comprises monitoring said compiling for a compilation requirement employed in determining the initial number of times received non-native instructions are to be executed before compiling ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]); and updating a current understanding of the compilation requirement if said monitoring observes the compilation requirement to be different from the current understanding (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a – a state diagram describing the generation

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timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045] – the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile).

19. **As to claim 14** (incorporating the rejection in claim 11), Chauvel discloses the method wherein the generated object code comprises a plurality of native instructions, and the method further comprises monitoring execution of the generated object code for execution requirements of the native instructions; and updating execution requirements of selected ones of the native instructions if said monitoring observes execution requirements for the selected ones of the native instructions to be different from current understandings of the execution requirements of the selected ones of the native instructions (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a – a state diagram describing the generation timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045]

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– the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile).

20. **As to claim 19** (incorporating the rejection in claim 18), Chauvel discloses the article wherein the runtime manager is further equipped to determine the initial number of times the received non-native instructions are to be executed before performing compiling the received non-native instructions ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]).

21. **As to claim 20** (incorporating the rejection in claim 18), Chauvel discloses the article wherein the runtime manager is further equipped to monitor said compiling for a compilation requirement employed in determining the initial number of times received non-native instructions are to be executed before

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compiling ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]); and update a current understanding of the compilation requirement if said monitoring observes the compilation requirement to be different from the current understanding (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a – a state diagram describing the generation timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045] – the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile).

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22. **As to claim 21** (incorporating the rejection in claim 18), Chauvel discloses the article wherein the generated object code comprises a plurality of native instructions, and the runtime manager is further equipped to monitor execution of the generated object code for execution requirements of the native instructions; and update execution requirements of selected ones of the native instructions if said monitoring observes execution requirements for the selected ones of the native instructions to be different from current understandings of the execution requirements of the selected ones of the native instructions (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a – a state diagram describing the generation timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045] – the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile).

23. **As to claim 23** (incorporating the rejection in claim 22), Chauvel discloses the system wherein said optimizing comprises analyzing an object code segment

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for execution power level requirement, and determining whether an alternative object code segment with lower execution power level requirement is available (Abstract – creating application profiles that indicate the number of execution of each operation in the application and virtual machine profiles which indicate the time/energy consumed by each operation on a particular hardware platform; an application profile in conjunction with the virtual machine profile can be used to generate time and/or energy estimates for the application; [0062] – to adapt the JVM profile in order to obtain energy consumption estimations of a JAVA™ application; instead of (or in addition to) profiling the execution time on the target, the estimation of energy consumption could be performed using the same principle as for execution; the energy performance (and execution time performance) could be used by the target device for scheduling applications; [0066], Lines 32-35 – acquiring a virtual machine profile that relates power consumption to individual operations; [0010] – to optimize an application, estimations of execution time or energy consumption are often needed; this is particular true in the case of mobile devices, such as smart phones, personal digital assistants, and the like, which have limit energy and processing resources).

24. **As to claim 24** (incorporating the rejection in claim 22), Chauvel discloses the system wherein said optimizing comprises analyzing an object code segment for execution energy consumption, and determining whether an alternative object code segment with lower execution energy consumption is available (Abstract –

creating application profiles that indicate the number of execution of each operation in the application and virtual machine profiles which indicate the time/energy consumed by each operation on a particular hardware platform; an application profile in conjunction with the virtual machine profile can be used to generate time and/or energy estimates for the application; [0062] – to adapt the JVM profile in order to obtain energy consumption estimations of a JAVA™ application; instead of (or in addition to) profiling the execution time on the target, the estimation of energy consumption could be performed using the same principle as for execution; the energy performance (and execution time performance) could be used by the target device for scheduling applications; [0066], Lines 32-35 – acquiring a virtual machine profile that relates power consumption to individual operations; [0010] – to optimize an application, estimations of execution time or energy consumption are often needed; this is particular true in the case of mobile devices, such as smart phones, personal digital assistants, and the like, which have limit energy and processing resources).

25. **As to claim 25** (incorporating the rejection in claim 22), Chauvel discloses the system wherein the apparatus further comprises a wireless communication interface to receive the non-native instructions ([0010], Lines 1-3 – to optimize an application, estimations of execution time or energy consumption are often needed; this is particularly true in the case of mobile devices...; [0061], Lines 1-7 – can be downloaded through a network).

26. **As to claim 27** (incorporating the rejection in claim 26), Chauvel discloses the system wherein the runtime manager is further equipped to determine the initial number of times the received non-native instructions are to be executed before invoking the compiler to compile the received non-native instructions ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]).

27. **As to claim 28** (incorporating the rejection in claim 26), Chauvel discloses the system wherein the runtime manager is further equipped to monitor said compiling for a compilation requirement employed in determining the initial number of times received non-native instructions are to be executed before compiling ([0012] – performance for a specified portion of an application, where the specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual



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machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]); and update a current understanding of the compilation requirement if said monitoring observes the compilation requirement to be different from the current understanding (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a – a state diagram describing the generation timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045] – the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile).

28. **As to claim 29** (incorporating the rejection in claim 26), Chauvel discloses the system wherein the generated object code comprises a plurality of native instructions, and the runtime manager is further equipped to monitor execution of the generated object code for execution requirements of the native instructions ([0012] – performance for a specified portion of an application, where the

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specified portion can include all or part of the application, the executes on a target device via a virtual machine interface is estimated by acquiring an application profile that specifies a number of executions for a plurality of operations used in the specified portion of the application, acquiring a virtual machine profile that relates a performance characteristic to individual operations and generating an aggregate value for the performance characteristic based on the application profile and the virtual machine profile; [0013]); and update execution requirements of selected ones of the native instructions if said monitoring observes execution requirements for the selected ones of the native instructions to be different from current understandings of the execution requirements of the selected ones of the native instructions (Fig. 2 – a state diagram describing the generation of an application profile; [0029] – the execution of each operation in the application increments a counter associated with the particular operation.; each executed operation is counted until an off command is received; a save results command causes the values of the counters to be stored in file; Fig. 3a – a state diagram describing the generation timing information for a virtual machine profile; Fig. 3b – a state diagram describing the generation energy information for a virtual machine profile; [0045] – the energy consumption data could be based on resources used by the operation and the time of execution; maximum and minimum execution times associated with the operation are maintained as well; upon receiving the save results command, the average energy consumption is calculated for each operation and is stored in the JVM profile).

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29. **As to claim 30** (incorporating the rejection in claim 26), Chauvel discloses the system wherein the communication interface is a wireless communication interface ([0010], Lines 1-3 – to optimize an application, estimations of execution time or energy consumption are often needed; this is particularly true in the case of mobile devices...; [0061], Lines 1-7 – can be downloaded through a network).

### **Conclusion**

30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Chauvel et al., System and Method for Executing Tasks According To a Selected Scenario in Response to Probabilistic Power Consumption Information of Each Scenario (Pat. No. US 7,111,177 B1)
- Chauvel al., JAVA DSP Acceleration by Byte-Code Optimization (Pat. No. US 7,146,613 B2)

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben C. Wang whose telephone number is 571-270-1240. The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on 571-272-3695. The fax

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phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BCW *\$W*

  
TUAN DAM  
SUPERVISORY PATENT EXAMINER

May 22, 2007